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ABSTRACT

The purpose of this paper is to empirically assess the accuracy of gender stereotypes, questioning whether stereotypes are highly inaccurate exaggerations of relatively minor real gender differences or accurate reflections of real gender differences. An assessment was made of the gender stereotypes of college students regarding the average grade point averages (GPAs) and percentage of female and male students in 12 different college majors. Participants' (154 female and 111 male students) perceptions were compared to actual GPAs and the actual percentage of female and male students in these majors. Thus, the extent to which participants' perceptions were stereotypic and inaccurate could be assessed. Participants underestimated the percentage of females in nine majors. In addition, participants overestimated the GPAs of male students more than the GPAs of female students. This was especially pronounced for male-dominated majors. The results of this study indicate that gender stereotypes are highly inaccurate and detrimental to the educational advancement of females. Findings are illustrated in appended tables and graphs. Contains 32 references. (LSR)

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Inaccurate Gender Stereotypes regarding GPAs and Representation of Female Students by Major

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Abstract

This research assessed the gender stereotypes of college students regarding the average GPAs and percentage of female and male students in 12 different college majors. Participants' perceptions were compared to the actual GPAs and the actual percentage of female and male students in these majors. Thus, the extent to which participants' perceptions were stereotypic and inaccurate could be assessed. Participants underestimated the percentage of females in 9 majors. In addition, participants overestimated the GPAs of male students more than the GPAs of female students. This was especially pronounced for masculine majors. The implications of this evidence for stereotyping are discussed.

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Inaccurate Gender Stereotypes regarding GPAs and Representation of Female Students by Major

As defined by Judd and Park (1993, p. 110), a "stereotype is an individual's set of beliefs about the characteristics or attributes of a group." One of the most salient groups, a basic category so to speak, is biological sex (Fiske, 1993; Stangor & Lange, 1994). Given the salience of biological sex, it is not surprising that the existence of pervasive gender stereotypes is well-documented. For example, in an oft-cited article Broverman, Vogel, Broverman, Clarkson, and Rosenkrantz (1972) found that males were described more often in positive terms connoting competence than females. Although females were described positively for their warmth and expressiveness, they were also seen as incompetent and passive. Males and females shared these gender stereotypes to a similar degree (Broverman et al., 1972). More recent studies have also found that men are assumed to have instrumental traits, whereas women are considered expressive (Deaux & Lewis, 1983; Martin, 1987). This research has been cited as evidence for the existence of pervasive negative gender stereotypes which might ultimately lead to gender discrimination (e.g., O'Leary & Hansen, 1983).

Stereotypes are <u>not</u> by definition inaccurate (Judd & Park, 1993; Jussim, Eccles, & Madon, 1995; Mackie, 1973). For example, there is truth to the stereotype that most Math majors are male. An intriguing question is whether gender stereotypes are highly inaccurate exaggerations of relatively minor real gender differences or whether they accurately reflect real gender differences. The purpose of this paper is to empirically assess the accuracy of stereotypes. Attesting to the fact that research on stereotype accuracy is growing is the recent publication of <u>Stereotype accuracy: Toward appreciating group differences</u> (Lee, Jussim, & McCauley, 1995). Such research represents an advance over previous research which presupposed that stereotypes are inaccurate.

Some researchers have voiced concern over research on stereotype accuracy. They fear that this research "at worst may result in our unintentionally communicating to the society at large that stereotypes are by and large accurate and, thus, generally appropriate to use as a basis for judging others" (Stangor, 1995, p. 278). In addition to ethical concerns, progress in research on stereotype

accuracy has been impeded by rather formidable methodological challenges. The main difficulty has been finding an objective benchmark for real gender differences against which stereotypes can be compared. One purpose of this paper is to show that the accuracy of gender stereotypes is empirically assessable. Further, research on stereotype accuracy can, contrary to Stangor's claims, point to inequities, providing impetus for societal change. Presently, different approaches to the assessment of the accuracy of gender stereotypes coexist.

Review of the literature on the accuracy of gender stereotypes

Measures using aggregated self-perceptions as benchmarks

Some researchers have used participants' self-perceptions as benchmarks of reality. For example, in their efforts to assess the accuracy of gender stereotypes Martin (1987), and in a more recent replication Allen (1995), used criterion ratios as benchmarks for accuracy. Criterion ratios are calculated as the percentage of men who endorse a particular trait divided by the percentage of women who endorse the same trait (Martin, 1987). Thus, the criterion ratio represents a self-report measure of accuracy against which participants' gender stereotypes are compared. Martin (1987) and Allen (1995) found that stereotypes of gender differences in traits tended to be more extreme than self-reported differences in traits. However, self-reports represent a problematic measure of real gender differences because they may be fraught with social desirability biases. For example, female participants may describe other females as passive but present themselves in a favorable i.e., active, light. Therefore, these findings should be interpreted with caution. A similar concern regarding the use of self-reports of traits as a measure of reality holds for a study by Jussim, Milburn, and Nelson (1991). They found that women were stereotyped as more emotionally open than men, whereas there was only a small gender difference in self-reported emotional openness. Martin (1987), Allen (1995), and Jussim et al. (1991) concluded that although there was a kernel of truth to gender stereotypes, they were overgeneralizations of real gender differences.

Reality criteria

Some studies used a reality criterion to assess stereotype accuracy. Reality criteria are relatively objective benchmarks against which participants' stereotypes can be compared.

Swim (1994) compared meta-analytically derived gender differences in social and nonverbal behaviors and cognitive abilities to participants' stereotypes of gender differences in these areas. In Study 1 she reported a somewhat greater incidence of over- than underestimation of real gender differences, especially for favorable female characteristics. However, in Study 2 she found more evidence for underestimation than overestimation of gender differences.

McCauley, Thangavelu, and Rozin (1988), McCauley and Thangavelu (1991), and Swim, Aikin, Hall, and Hunter (1995) compared participants' estimates of the percentage of females in various occupations with census data on female representation in the same occupations. Respondents underestimated the gender differences in employment patterns i.e., they were unaware of the extent of occupational gender segregation. However, by using mostly highly gender-segregated occupations as stimuli, these researchers unwittingly introduced a methodological problem. These stimuli may have produced a ceiling effect: When the degree of occupational segregation is high, say 90% female, 10% male, overestimation of the degree of gender segregation is unlikely, and a finding of underestimation of real gender differences is virtually ensured.

Summary of the accuracy literature

The extant literature has found evidence for the inaccuracy of gender stereotypes. However, the direction of the inaccuracy differs by study. While Martin's (1987), Allen's (1995), and Jussim et al.'s (1991) research suggests that gender stereotypes are mostly overestimations of real gender differences, the research by McCauley and Thangavelu (1991; McCauley et al., 1988) and by Swim (1994; et al., 1995) suggests that gender stereotypes underestimate the extent of real gender differences.

The inconsistency of these results may be due to 1. differences in the operational definitions of accuracy (self-reports vs. reality criteria) and/or 2. the content area of the assessed stereotypes

(personality traits vs. gender representation in different occupations). In addition, both strains of research have suffered from methodological problems, making the interpretation of their results difficult.

The goals and hypotheses of this study

It was one goal of this study to broaden the range of assessments of the accuracy of gender stereotypes to include the academic domain. Two measures of gender stereotypes in the academic domain were employed: Estimates of the percentage of female and male students and estimates of the GPAs of female and male students in various majors. These data were compared to reality criteria i.e., data on the actual GPAs and female and male representation in different majors procured from the registrar's office.

Gender stereotypes in the academic area are likely to have consequences for the choice of one's major and ultimately one's profession. For example, if a certain major is perceived as masculine, females may avoid that major. If it is believed that students receive higher grades in gender-congruent majors, female students may be further dissuaded from choosing a gender-incongruent (i.e., male-dominated) major. A similar effect might occur for males.

It was hypothesized that the gender-type of a major i.e., whether a given major is perceived as masculine or feminine, would affect the accuracy of gender stereotypes. Previous studies on stereotyping have failed to investigate the gender-type of a domain as an independent variable. This is unfortunate because aggregating the results of the accuracy of gender stereotypes without regard for gender-type of domain might obscure meaningful patterns and hamper theoretical progress. Research on gender differences in the accuracy of self-perceptions has pointed out the importance of this variable (Beyer, 1990; Beyer & Bowden, in press).

It is hypothesized that the more a given behavior violates the norm i.e., the more gender-incongruent a major, the more likely it is that the gender stereotype is inaccurate. Stereotypes may be more accurate when norms are not violated i.e., in gender-congruent majors. For example, Barnes-Farrell, L'Heureux-Barrett, and Conway (1991) found that evaluations of tasks which were

congruent rather than incongruent with job gender-type (e.g., customer/client relations for a corporate secretary) were more accurate. If norm violation is a factor, estimates of the percentage of female students should be more accurate in gender-congruent than gender-incongruent majors. In addition, estimates of GPAs should be more accurate for gender-congruent than gender-incongruent majors.

However, it was predicted that the results for GPA would be further complicated by another factor: A general tendency to ascribe less competence to females. Meta-analyses have found small differences in the ratings of the identical performances of female and male targets, favoring male targets (Eagly, Makhijani, & Klonsky, 1992; Swim, Borgida, Maruyama, & Myers, 1989). It appears that females ascribe to the view of lesser female competence to the same degree as males do (Broverman et al., 1972). Because of this general view of greater male competence, participants should overestimate to a lesser degree the GPAs of female compared to male students. This predicts a significant main effect for target gender.

Method

Participants

Participants were 154 female and 111 male students at the University of Wisconsin-Parkside who participated for course credit in General Psychology. In the spring of 1994 55.5% of the students at this institution were female, which is similar to the national average of 55.1% (Chronicle of Higher Education Almanac, 1995).

Procedure

Participants were asked questions regarding their perceptions of their fellow students in different majors at the University of Wisconsin-Parkside. The following 12 majors were rated by participants in one of two random orders: Art, Biology, Business, Chemistry, Communication, Computer Science, English, History, Mathematics, Music, Political Science, and Psychology. These majors were selected based on two criteria: Majors with fewer than 30 declared students

were not selected and the broad spectrum of majors available at the university was to be represented.

Participants estimated the percentages of female compared to male college students at the present university who had declared one of the above 12 majors. The two percentages for male and female college students were constrained to add up to 100%. Participants also estimated the average GPAs (from 0 to 4.0) of female and male students who had declared one of the 12 majors. Respondents rated all 12 majors.

Information on the actual GPAs and the percentage of male and female college students who were declared in each of the 12 majors was procured from the Registrar's Office. Students with fewer than 10 credits at the present institution i.e., recent transfer students, were deleted from this list because GPAs accumulated elsewhere might not be comparable to GPAs at the present institution. The GPA and percentage data were based on 543 male and 732 female college students who had declared one of the 12 rated majors and were enrolled at the present institution during the fall semester of 1993. This represents 74.8% of declared female and 79% of declared male majors with at least 10 credits for whom information was available. (The remainder had declared majors that were not included in the present study.)

Results

Results were analyzed by means of analyses of variance (ANOVAs) and t-tests. Degrees of freedom vary slightly due to missing values. All tests are two-tailed.

Actual percentage of female and male students in different majors

Table 1 lists the actual percentage of female college students declared in the 12 majors. (Because percentages were constrained to add up to 100%, the percentage of males in a major is an exact mirror-image of the percentage of females.) Six majors had a greater percentage of female students and six majors were male-dominated. The greatest percentage of female compared to male college students was found in Psychology, followed by Art, Communication, English, Biology, and

Business. Computer Science was the most male-dominated major followed by Math, Chemistry, History, Political Science, and Music.

Participants' estimates of the percentage of female and male students in different majors

Table 1 lists participants' estimates from what they perceived to be the most female-dominated to the most male-dominated major. Participants believed that the most female-dominated major was English followed by Psychology, Communication, Music, and Art. These majors will henceforth be referred to as feminine[1] majors. Computer Science was considered the most male-dominated major followed by Chemistry, Business, History, Math, Political Science, and Biology. These majors will henceforth be referred to as masculine[2] majors. Participants' categorizations of a major as feminine or masculine were not entirely correct. They mistakenly believed that Music was a female-dominated major and that Biology and Business were male-dominated majors. These miscategorizations reveal gender stereotypes. The Fine Arts are stereotypically perceived as feminine, therefore Music may have been misperceived as feminine. On the other hand, the Natural Sciences and Business are typically considered masculine endeavors and thus Biology and Business may have been mistakenly considered male-dominated.

Accuracy of perceived gender representation in different majors

For each major, the actual percentage of female students was subtracted from participants' estimates of the percentage of female students declared in the major. Positive (negative) difference scores indicate an overestimation (underestimation) of female students within a given major. In order to understand the effect of the gender-type of major on the accuracy of stereotypes, an average accuracy score for the five feminine majors (English, Psychology, Communication, Music, and Art) was calculated. Further, an average accuracy score for the seven masculine majors (Computer

[1] More descriptive, but very cumbersome terms would be "perceived-to-be female-dominated" and "perceived-to-be male-dominated." Thus, "feminine" and "masculine" refer to participants' perceptions of which gender is more likely to major in a particular subject. These terms are not synonymous with the actual predominance of a gender in a particular major (cf. below).

Science, Chemistry, Biology, History, Math, Political Science, and Biology) was calculated.[2] These average accuracy scores were then subjected to a 2 (participant gender) x 2 (gender-type of major) ANOVA with gender-type of major as a within-subjects variable. (Results for the percentage of males in a major are exact mirror-images of these analyses. For this reason target gender cannot be used as an independent variable in this particular analysis.)

Although absolute accuracy in estimating the percentage of female and male students was not expected, if random error were at work, participants should at times overestimate and sometimes underestimate the percentage of female students. If the norm violation hypothesis is correct, the percentage of female students should be estimated most accurately in feminine majors. Accuracy scores of the percentage estimates of female students are depicted by each major in Figure 1. In general, the percentage of female students was underestimated (see Table 1).

The gender-type of the majors did not significantly affect the accuracy of the estimated percentage of female students, $F(1, 262) < 1$. However, participant gender and gender-type of major interacted in their effect on the accuracy of estimates of the percentage of female students, $F(1, 262) = 14.39$, $p < .0001$. To determine the nature of this interaction planned comparisons were calculated. The gender difference in underestimations of the percentage of females was especially pronounced for masculine majors, $t(264) = 3.94$, $p < .0001$, where males underestimated the percentage of female students less than did females. Contrary to the norm violation hypothesis, females' underestimation of the percentage of female students did not depend on the gender-type of the major, $t(153) < 1$. However, males' underestimation of the percentage of female students was greater for feminine than masculine majors, $t(111) = 6.07$, $p < .0001$. Although the norm violation explanation was not supported, it is clear that random factors were not at work: The underestimation of the percentage of female students was pervasive.

To ensure that the above pattern of findings replicates for individual majors, within each major t-tests by gender were calculated. For 9 out of 12 majors the percentage of female students

[2] It should be kept in mind that these are majors the participants perceived to be female- or male-dominated.

was significantly underestimated and concomitantly the percentage of male students overestimated, all ts at least $(260) > 3.75$, $ps < .0001$. The underestimation of the percentage of female students was often quite substantial (see Figure 1). The only overestimations of the percentage of female students occurred for Music, $t(262) = 6.62$, $p < .0001$, and Computer Science, $t(260) = 11.85$, $p < .0001$. The only major for which participants accurately estimated the percentage of female and male students was Math, $t(263) < 1$.

These results are strong evidence for inaccurate gender stereotypes. Participants were not appropriately aware of the presence of female students. What is especially striking about this finding is the fact that participants did not make estimates about an unknown group of people but their peers whom they encounter in classrooms, hallways, the cafeteria, etc. on a daily basis.

So far we have considered whether participants can accurately estimate the percentage of female and male students. A related question is whether participants over- or underestimate the extent of actual gender segregation in participation in a major (see Table 1). The extent of gender segregation was overestimated for five majors (Music, Political Science, Business, History, and Chemistry). These represent majors that are male-dominated or perceived as masculine. However, they also represent majors with relatively little gender segregation. The extent of gender segregation was underestimated in six majors (English, Psychology, Communication, Art, Biology, and Computer Science). With the exception of Computer Science these are female-dominated majors. However, these also are majors where the real extent of gender segregation is relatively large. The results for math are split, with females overestimating and males underestimating the real extent of gender segregation.

The pervasive phenomenon of underestimating the percentage of females virtually regardless of major coupled with the fact that feminine majors were more gender-segregated than masculine majors explains the pattern of results. In feminine majors the underestimation of the percentage of females leads to estimates close to 50% (parity), thereby underestimating the relatively large size of gender segregation. On the other hand, underestimating the percentage of females in masculine

majors, where real gender segregation is less prevalent, leads to estimates of the percentage of female students in the 30% range, far away from parity, thereby overestimating gender differences. The net result is that participants underestimated the gender segregation for female-dominated majors but overestimated the gender segregation for male-dominated majors. This finding points out the importance of investigating the gender-type of a domain and the inclusion of stimulus materials that show considerable range in the size of real gender differences.

Actual gender difference in GPAs for different majors

Female college students received higher GPAs than male college students for all of the 12 rated majors (see Table 2). This gender difference reached statistical significance for Psychology, $t(184) = 2.26$, $p < .03$, and was of borderline significance for Art, $t(77) = 1.84$, $p < .07$, Communication, $t(98) = 1.88$, $p < .07$, and History, $t(69) = 1.70$, $p < .10$. These results are similar to those by Bank (1995) who found that females had higher GPAs and made faster progress towards degree completion than did males.

Participants' estimates of female and male students' GPAs

The average estimated GPAs for masculine and feminine majors were calculated. This dependent variable was submitted to an ANOVA with participant gender, target gender (female or male students being rated), and gender-type of major as independent variables in a 2 x 2 x 2 design. Target gender and gender-type of major were within-subjects variables.

The interaction among participant gender, gender-type of major, and target gender was significant, $F(1, 262) = 4.78$, $p < .03$. As Table 2 illustrates, male and female participants' estimates of the GPAs of college students depended on the gender-type of the major and target gender. These results were followed up with 2 x 2 (target gender x gender-type of major) ANOVAs for each sex. As hypothesized, females rated males' GPAs on masculine majors higher than females' GPAs, but rated females' GPAs on feminine majors higher than males' GPAs, $F(1, 152) = 93.23$, $p < .0001$. Males rated males' and females' GPAs in masculine majors the same but rated

females' GPAs in feminine majors higher than males' GPAs, $F(1, 110) = 75.07$, $p < .0001$.

To ensure that these findings are actually replicated for the individual majors, 2 (participant gender) x 2 (target gender) ANOVAs were calculated for each of the 12 majors. The effect of target gender was significant for all majors save History, $F(1, 259) = 2.64$, $p < .11$. As expected, participants estimated higher GPAs for female than male college students in the feminine majors English, Psychology, Communication, Music, and Art, all Fs at least $(1, 258) > 6.78$, $ps < .01$, and higher GPAs for males than females in the masculine majors Chemistry, Math, Computer Science, Political Science, Biology, and Business, all Fs at least $(1, 256) > 4.64$, $ps < .04$. Thus, as hypothesized, participants' estimates of GPAs depended on the perceived gender-congruence of the major. The important question, however, is whether these gender stereotypes are inaccurate.

Accuracy of participants' estimates of female and male students' GPAs

For all 12 majors participants' estimates of female and male students' GPAs were subtracted from actual GPAs. Positive (negative) difference scores indicate an overestimation (underestimation) of GPAs within a given major. These accuracy scores were subjected to an ANOVA with participant gender, target gender, and gender-type of the major as independent variables in a 2 x 2 x 2 design with target gender and gender-type of the major representing within-subject variables.

Participants overestimated students' GPAs (see Figures 2 and 3). This may explain why many students are displeased with Bs. In their minds the average person receives grades better than B and they conclude that so should they. The triple interaction among participant gender, target gender, and gender-type of major was significant, $F(1, 262) = 4.54$, $p < .04$. As hypothesized, the GPAs of male students were overestimated significantly more than the GPAs of female students, $F(1, 262) = 292.53$, $p < .0001$. The greater overestimation of male students' compared to female students' GPAs depended on the major being rated, $F(1, 262) = 57.89$, $p < .0001$. It was especially pronounced in masculine majors and especially by females, $F(1, 262) = 5.92$, $p < .02$. These results support the norm violation explanation.

To ensure that these results would be replicated for individual majors 2 (participant gender) x 2 (target gender) ANOVAs were calculated for each of the 12 majors. Males' GPAs were overestimated more than females' GPAs for all majors except English, Fs at least (1, 258) > 6.06, ps < .02 (see Figures 2 and 3). For English, females' grades were overestimated more than males' grades, $F(1, 261) = 20.08$, $p < .0001$. Females compared to males significantly overestimated males' GPAs more than females' GPAs for the masculine majors Chemistry, Political Science, and Biology, all Fs at least (1, 256) > 5.49, ps < .02.

Did participants over- or underestimate the size of the actual gender difference in GPAs? The gender difference in GPAs was underestimated for all majors except English, where it was overestimated. It is important to note that for the seven masculine majors, participants misperceived the direction of the gender difference in GPAs. Despite higher GPAs by female students in masculine majors, participants believed that male students would attain higher GPAs.

Discussion

Stangor (1995, p. 278) claims that a "focus on the content accuracy of stereotypes is premature because we do not yet have a well-established method for documenting those group differences themselves". The present study has demonstrated that the pessimism in this statement is unjustified. This study was able to meaningfully assess the content accuracy of stereotypes. Furthermore, this study should allay Stangor's (1995) concern that research on stereotype accuracy may have dangerous societal repercussions. As the discussion will show, the results of this study indicate that gender stereotypes are highly inaccurate and detrimental to the educational advancement of females.

The low visibility of female students

Currently over 8 million women attend a college or university in the US, composing 55.1% of the total enrollment (Chronicle of Higher Education Almanac, 1995). In 1994 the percentage of female students at the present institution was 55.5%, making its gender distribution highly

representative of colleges and universities nationwide.

A disturbing finding of the present research is that the percentage of female students in most majors is grossly underestimated by individuals who come into contact with female students on a daily basis. This suggests that female students are somehow less visible to their fellow students than are male students. This low visibility of female students is a pervasive phenomenon shown both by male and female participants (see Figure 1). Apparently females are not exempt from being biased against females. Banaji and Greenwald (1995), Broverman et al. (1972) , Deaux and Emswiller (1974), Jussim et al. (1991), and Swim et al. (1989) also found that there is no difference in the extent to which females and males hold gender stereotypes or are biased against female targets.

The inaccurate stereotype still is that males are more prevalent in higher education. The size of the underestimation of the presence of female students is especially surprising given that students are confronted with female students in classrooms and hallways every day. In fact, the major in which the greatest underestimation of the percentage of female students occurred was Psychology, despite the fact that participants were enrolled in General Psychology, a course heavily populated by female students. This illustrates that gender stereotypes, even if inaccurate, are quite resistant to change. This conclusion is supported by research which found that the presentation of counter-stereotypical information and attempts to dispel gender stereotypes by promising rewards for accurate rather than stereotypical responses are unsuccessful in altering gender stereotypes (Biernat, 1993; Nelson, Biernat, & Manis, 1990). One reason for this is the pervasive tendency to gather stereotype-confirming rather than disconfirming evidence (Snyder, Campbell, & Preston, 1982).

A further finding of this research is that participants underestimated the extent of gender segregation in feminine majors but overestimated the degree of gender segregation in masculine majors. This pattern was obtained because of the pervasive tendency to underestimate the percentage of female students.

The present results are similar to the findings by McCauley et al. (1988), McCauley and

Thangavelu (1991), and Swim (1994; et al., 1995, Study 2) for feminine majors only. They found that participants underestimated gender differences. For masculine majors, this research replicates the findings by Martin (1987), Allen (1995), and Swim (1994, Study 1) who found that participants mostly overestimated gender differences in personality traits. This suggests that the inconsistent findings of over- vs. underestimation of gender differences in previous studies may not only be due to differences in the operational definitions of accuracy (self-reports vs. reality criteria) and subject area (traits vs. ratings of occupations). A further source of discrepancies is the gender-type of the variables under investigation. This variable deserves more attention in future research.

A major difference between the above studies and the present study is that in this study participants judged a group with which they were very familiar viz., their peers, rather than unfamiliar categories of people (e.g., female lawyers). The fact that this increased familiarity with the target group did not diminish inaccurate gender stereotypes is disconcerting. A strength of the present study is that it included majors with varying degrees of gender segregation, whereas the studies by McCauley et al. (1988), McCauley and Thangavelu (1991), and Swim (1994; et al., 1995, Study 2) employed occupations for which the degree of gender segregation could only be underestimated.

One consequence of the low visibility of female students may be the neglect of their needs. For example, on this campus there was an outcry over the conversion of the sole restroom on one floor from a men's to a women's facility. Several students complained that mostly males were taking classes on that floor and that therefore the restroom should remain a men's facility. Because in addition to Computer Science (a relatively small major), many Business and Psychology classes with a preponderance of female students are held on that floor, this was clearly a misconception.

A further consequence of the low visibility of female students may be a lack of appreciation of the fact that females are actively pursuing higher education. In 1994-1995, 52.1% of Bachelor's degree recipients and 52.5% of Master's degree recipients were female (Digest of Education Statistics, National Center for Education Statistics). Yet, when discussing the wage gap students

often try to explain it away by stating that females are less educated than males. This may also explain some women's complacency about the wage gap. They believe that if they receive a college degree, they will earn as much as males.

Low awareness of female competence

Although not statistically significant for all majors, female students surpassed male students in GPA regardless of major. Even female students in masculine majors attained higher GPAs than male students. Participants were strikingly unaware of this fact. They overestimated the GPAs of male students more than the GPAs of female students, especially for those majors which they considered masculine. Even more disconcerting is the fact that participants were convinced that contrary to reality male students receive higher GPAs in masculine majors than do female students! Females were even more likely than males to overestimate males' compared to females' GPAs in masculine majors. Previous research by Goldberg (1968) and Pheterson, Kiesler, and Goldberg (1971) also found that females rated the work of males higher than the work of females. An alternative interpretation of the findings is that females' lesser overestimation of female students' GPAs is not an indication of negative bias against themselves but rather an enhanced awareness of females' grades. Individuals usually perceive their in-group more accurately than an out-group (Judd & Park, 1993).

The gender difference in GPAs was mostly underestimated by both male and female participants. This underestimation is quite unfortunate because it perpetuates the view of lesser female competence, especially in masculine domains. If female participants remain unaware of the fact that female students in masculine domains actually do better than their male counterparts, they will not be encouraged to venture into gender-incongruent majors.

Overall, the results suggest that females are still perceived as less capable than males in traditionally masculine domains such as the natural sciences. This stereotype can be harmful to females for two reasons. 1. It justifies the status quo. For example, the belief that females are less talented in Chemistry can be used to justify the fact that there are relatively few female chemists. 2.

More insidiously, females share the belief that females have less ability than males in the natural sciences. This may deter them from pursuing coursework in that domain which may restrict their future career choices and earning potential.

Conclusion

The results of this study indicate that gender stereotypes are highly inaccurate. Participants underestimated the percentage of female students and overestimated female students' GPAs much less than male students' GPAs. Furthermore, participants were not aware of the size of the actual gender difference in participation in different majors and GPAs. Participants at times overestimated and at other times underestimated the size of real gender differences. In many instances not only were participants inaccurate in judging the size of the gender difference but they actually misjudged its direction (e.g., estimating higher GPAs for male than female students in masculine majors when female students had attained higher GPAs).

Factors that influenced whether participants tended to over- or underestimate gender differences include the gender-type of the major and the size of the actual gender difference. Overestimation was more likely when the real gender difference was small, whereas underestimation was more likely when the gender difference was large. One cannot take solace in the fact that this study revealed more evidence for under- than overestimation of real gender differences. Underestimating the gender difference in actual GPAs, especially in masculine domains does not serve females well and can actually contribute to continued avoidance of male-dominated majors and professions by females.

In conclusion, gender stereotypes in the academic area are very much alive and kicking. Females and males share those highly inaccurate stereotypes to a similar degree. These stereotypes can have negative consequences for female students and therefore are cause for concern.

References

Allen, B. P. (1995). Gender stereotypes are not accurate: A replication of Martin (1987) using diagnostic vs. self-report and behavioral criteria. Sex Roles, 32, 583-600.

Banaji, M. R., & Greenwald, A. G. (1995). Implicit gender stereotyping in judgments of fame. Journal of Personality and Social Psychology, 67, 181-198.

Bank, B. J. (1995). Gendered accounts: Undergraduates explain why they seek their Bachelor's degree. Sex Roles, 32, 527-544.

Barnes-Farrell, J. L., L'Heureux-Barrett, T. J., & Conway, J. M. (1991). Impact of gender-related job features on the accurate evaluation of performance information. Organizational Behavior and Human Decision Processes, 48, 23-35.

Beyer, S. (1990). Gender differences in the accuracy of self-evaluations of performance. Journal of Personality and Social Psychology, 59, 960-970.

Beyer, S., & Bowden, E. M. (in press). Gender differences in self-perceptions: Convergent evidence from three measures of accuracy and bias. Personality and Social Psychology Bulletin.

Biernat, M. (1993). Gender and height: Developmental patterns in knowledge and use of an accurate stereotype. Sex Roles, 29, 691-713.

Broverman, I. K., Vogel, S. R., Broverman, D .M., Clarkson, F. E., & Rosenkrantz, P. S. (1972). Sex role stereotypes: A current appraisal. Journal of Social Issues, 28, 59-78.

Chronicle of Higher Education Almanac (1995). The nation. Vol. XLII, no. 1, p. 5.

Deaux, K., & Emswiller, T. (1974). Explanation of successful performance on sex-linked tasks. Journal of Personality and Social Psychology, 29, 80-85.

Digest of Education Statistics, National Center for Education Statistics

Deaux, K., & Lewis, L. L. (1983). Components of gender stereotypes. Psychological Documents, 13, 25. (Ms. No. 2584).

Eagly, A. H., Makhijani, M. G., & Klonsky, B. G. (1992). Gender and the evaluation of leaders: A meta-analysis. Psychological Bulletin, 111, 3-22.

Fiske, S. T. (1993). Social cognition and social perception. Annual Review of Psychology, 44, 155-194.

Goldberg, P. (1968). Are women prejudiced against women? Transaction, 5, 28-30.

Judd, C. M., & Park, B. (1993). Definition and assessment of accuracy in social stereotypes. Psychological Review, 100, 109-128.

Jussim, L., Eccles, J., & Madon, S. (1995). Social perception, social stereotypes, and teacher expectations: Accuracy and the quest for the powerful self-fulfilling prophecy. Advances in Experimental Social Psychology.

Jussim, L. Milburn, M., & Nelson, W. (1991). Emotional openness: Sex-role stereotypes and self-perceptions. Representative Research in Social Psychology, 19, 35-52.

Lee, Y.-T., Jussim, L. J., & McCauley, C. R. (1995). Stereotype accuracy: Toward appreciating group differences (pp. 215-243). Washington: American Psychological Association.

Mackie, M. (1973). Arriving at "truth" by definition: The case of stereotype accuracy. Social Problems, 20, 431-447.

Martin, C. L. (1987). A ratio measure of sex stereotyping. Journal of Personality and Social Psychology, 52, 489-499.

McCauley, C., & Thangavelu, K. (1991). Individual differences in sex stereotyping of occupations and personality traits. Social Psychology Quarterly, 54, 267-279.

McCauley, C., Thangavelu, K., & Rozin, P. (1988). Sex stereotyping of occupations in relation to television representations and census facts. Basic and Applied Social Psychology, 9, 197-212.

Nelson, T. E., Biernat, M. R., & Manis, M. (1990). Everyday base rates (sex stereotypes): Potent and resilient. Journal of Personality and Social Psychology, 59, 664-675.

O'Leary, V. E., & Hansen, R. (1983). Performance evaluation: A social-psychological perspective. In. F. Landy, S. Zedeck, & J. Cleveland (Eds.), Performance measurement and theory. Hillsdale, NJ: Erlbaum.

Pheterson, G. I., Kiesler, S. B., & Goldberg, P. A. (1971). Evaluation of the performance of women as a function of their sex, achievement, and personal history. Journal of Personality and Social Psychology, 19, 114-118.

Snyder, M., Campbell, B. H., & Preston, E. (1982). Testing hypotheses about human nature: Assessing the accuracy of social stereotypes. Social Cognition, 1, 256-272.

Stangor, C. (1995). Content and application inaccuracy in social stereotyping. In Y.-T. Lee, L. J. Jussim, & C. R. McCauley (Eds.), Stereotype accuracy: Toward appreciating group differences (pp. 275-292). Washington: American Psychological Association.

Stangor, C., & Lange, J. E. (1994). Mental representations of social groups: Advances in understanding stereotypes and stereotyping. Advances in Experimental Social Psychology, 26, 357-416.

Swim, J. K. (1994). Perceived versus meta-analytic effect sizes: An assessment of the accuracy of gender stereotypes. Journal of Personality and Social Psychology, 66, 21-36.

Swim, J. K., Aikin, K. J., Hall, W. S., & Hunter, B. A. (1995). Sexism and racism: Old-fashioned and modern prejudices. Journal of Personality and Social Psychology, 68, 199-214.

Swim, J., Borgida, E., Maruyama, G., & Myers, D. G. (1989). Joan McKay versus John McKay: Do gender stereotypes bias evaluations? Psychological Bulletin, 105, 409-429.

Table 1. A Comparison of Participants' Estimates of the Percentage of Female and Male Students in Various Majors Compared to Students' Actual Representation

Major Gender of Participant	Estimated % of Females	Actual % of Females	Estimated % of Males	Actual % of Males	Difference between Estimated % of Females and Males	Difference between Actual % of Females and Males	Over- or Under-estimation of Gender Difference	Is Direction of Over- or Under-estimation Correct?
English								
Females	61.4	64.2	38.6	35.9	22.8	28.3	Underestimation	Yes
Males	61.2		38.8		22.4		Underestimation	Yes
Psychology								
Females	59.9**	76.6	40.1**	23.4	19.8	53.3	Underestimation	Yes
Males	56.2**		43.8**		12.4		Underestimation	Yes
Communication								
Females	56.8*	64.3	43.2*	35.7	13.6	28.6	Underestimation	Yes
Males	54.0*		46.0*				Underestimation	Yes
Music								
Females	56.1	48.7	43.9	51.3	12.3	-2.6	Overestimation	No
Males	54.0		46.0		8.0		Overestimation	No
Art								
Females	52.3	70.1	47.7	29.9	4.6	40.3	Underestimation	Yes
Males	52.6		47.4		5.1		Underestimation	Yes
Biology								
Females	42.2	59.6	57.8	40.4	-15.6	19.2	Underestimation	No
Males	45.1		54.9		-9.8		Underestimation	No

Political Science								
Females	35.3***	48.3	64.7***	51.7	-29.3	-3.4	Overestimation	Yes
Males	42.5***		57.5***		-15.0		Overestimation	Yes
Business								
Females	38.0	53.8	62.0	46.2	-24.1	7.7	Overestimation	No
Males	39.2		60.8		-21.6		Overestimation	No
History								
Females	38.2	42.0	61.8	58.0	-23.6	-15.9	Overestimation	Yes
Males	38.8		61.2		-22.4		Overestimation	Yes
Math								
Females	36.4*	37.5	63.6*	62.5	-27.2	-25.0	Overestimation	Yes
Males	40.5*		59.5*		-19.0		Underestimation	Yes
Chemistry								
Females	33.0***	40.8	67.0***	59.2	-34.0	-18.4	Overestimation	Yes
Males	39.1***		60.9***		-21.8		Overestimation	Yes
Computer Science								
Females	32.8	23.5	67.2	76.5	-34.5	-52.9	Underestimation	Yes
Males	35.2		64.8		-29.6		Underestimation	Yes

Notes.
Asterisks indicate significant gender differences * $p < .05$ ** $p < .01$ *** $p < .0001$

Figure 1. Over- and Underestimation of the Percentage of Female Students in Different Majors

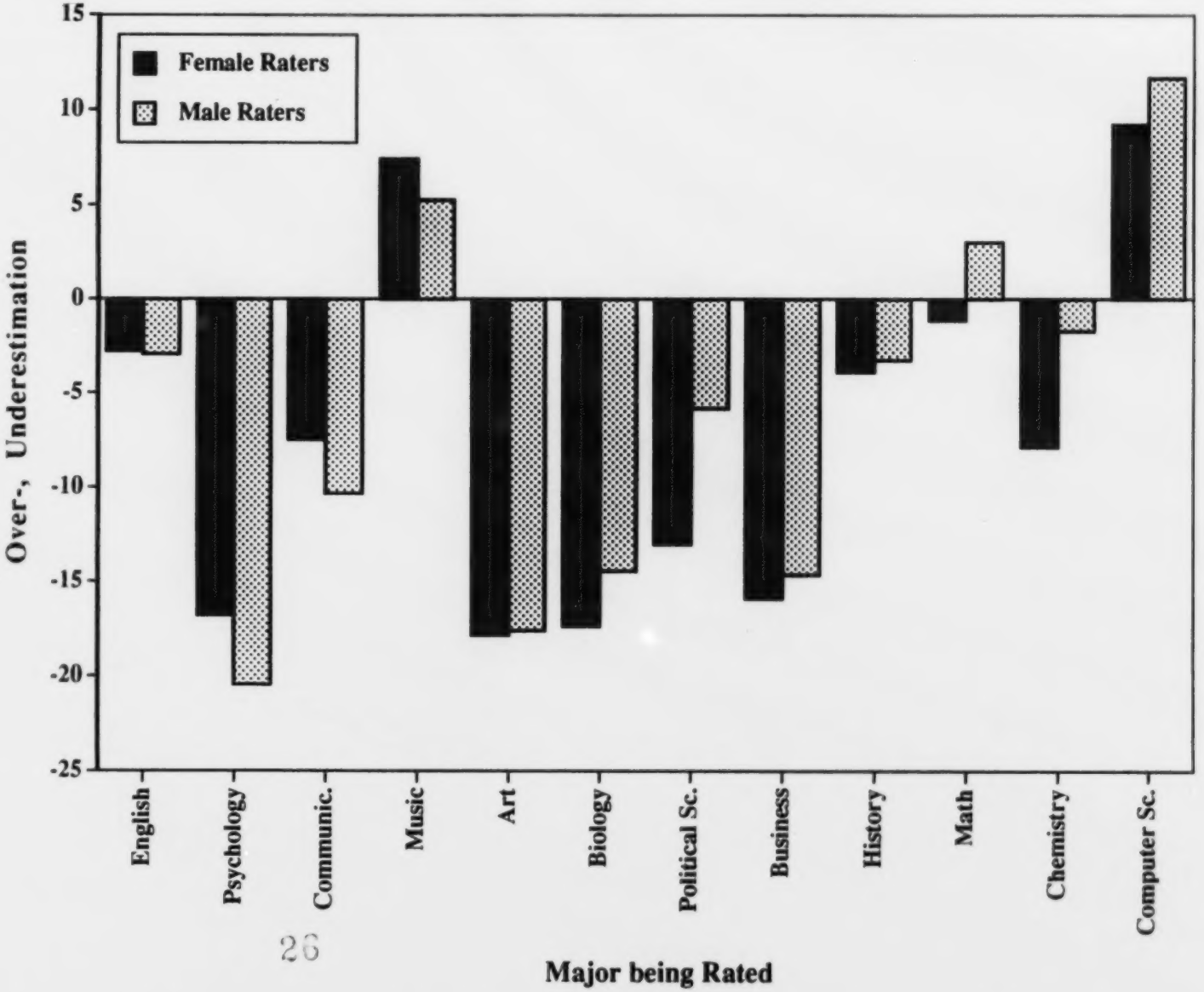

Table 2. A Comparison of Subjects' Estimates of Female and Male Students' GPAs and Students' Actual GPAs in Various M

Major Gender of Subject	Estimated GPAs of Females	Actual GPAs of Females	Estimated GPAs of Males	Actual GPAs of Males	Difference between Estimated GPAs of Females and Males	Difference between Actual GPAs of Females and Males	Over- or Under-estimation of Gender Difference	Is Direction of Over- or Under-estimation Correct?
English								
Females	3.33*	2.95	3.1	2.83	0.23	0.12	Overestimation	Yes
Males	3.21**[4]		3.03[4]		0.18		Overestimation	Yes
Psychology								
Females	3.29	2.89a	3.14	2.66a	0.15	0.23	Underestimation	Yes
Males	3.20[4]		3.10[4]		0.10		Underestimation	Yes
Communication								
Females	3.18*	2.92	3.03	2.72	0.15	0.20	Underestimation	Yes
Males	3.07**[4]		2.94[4]		0.13		Underestimation	Yes
Music								
Females	3.22***	3.08	3.11**	2.86	0.11	0.22	Underestimation	Yes
Males	3.06***[4]		2.95**[4]		0.11		Underestimation	Yes
Art								
Females	3.13**	2.92	3.08***	2.66	0.05	0.26	Underestimation	Yes
Males	2.99**[2]		2.90***[2]		0.09		Underestimation	Yes
Biology								
Females	3.29	3.01	3.35***	2.90	-0.06	0.11	Underestimation	No
Males	3.19[3]		3.19***[3]		0.00		Accurate	Yes

Political Science								
Females	3.17	3.04	3.21*	2.84	-0.04	0.20	Underestimation	No
Males	3.11[2]		3.09*[2]		0.02		Underestimation	Yes
Business								
Females	3.21	3.04	3.26	2.96	-0.05	0.08	Underestimation	No
Males	3.15[1]		3.17[1]		-0.02		Underestimation	No
History								
Females	3.15	3.03	3.18*	2.78a	-0.03	0.25	Underestimation	No
Males	3.1		3.09*		0.01		Underestimation	Yes
Math								
Females	3.27	2.91	3.35	2.82	-0.08	0.09	Underestimation	No
Males	3.21[4]		3.28[4]		-0.07		Underestimation	No
Chemistry								
Females	3.29	2.96	3.40*	2.79	-0.11	0.17	Underestimation	No
Males	3.24[4]		3.28*[4]		-0.04		Underestimation	No
Computer Science								
Females	3.25	3.15	3.33*	3.04	-0.08	0.11	Underestimation	No
Males	3.16[3]		3.22*[3]		-0.06		Underestimation	No

Notes.
Asterisks indicate significant gender differences * $p < .05$ ** $p < .01$ *** $p < .0001$
Number superscripts indicate significant effects of target gender [1] $p < .05$ [2] $p < .01$ [3] $p < .001$ [4] $p < .0001$
Letters indicate significant gender differences in GPAs a $p < .05$

Figure 2. Female Raters' Overestimation of Female and Male Students' GPAs

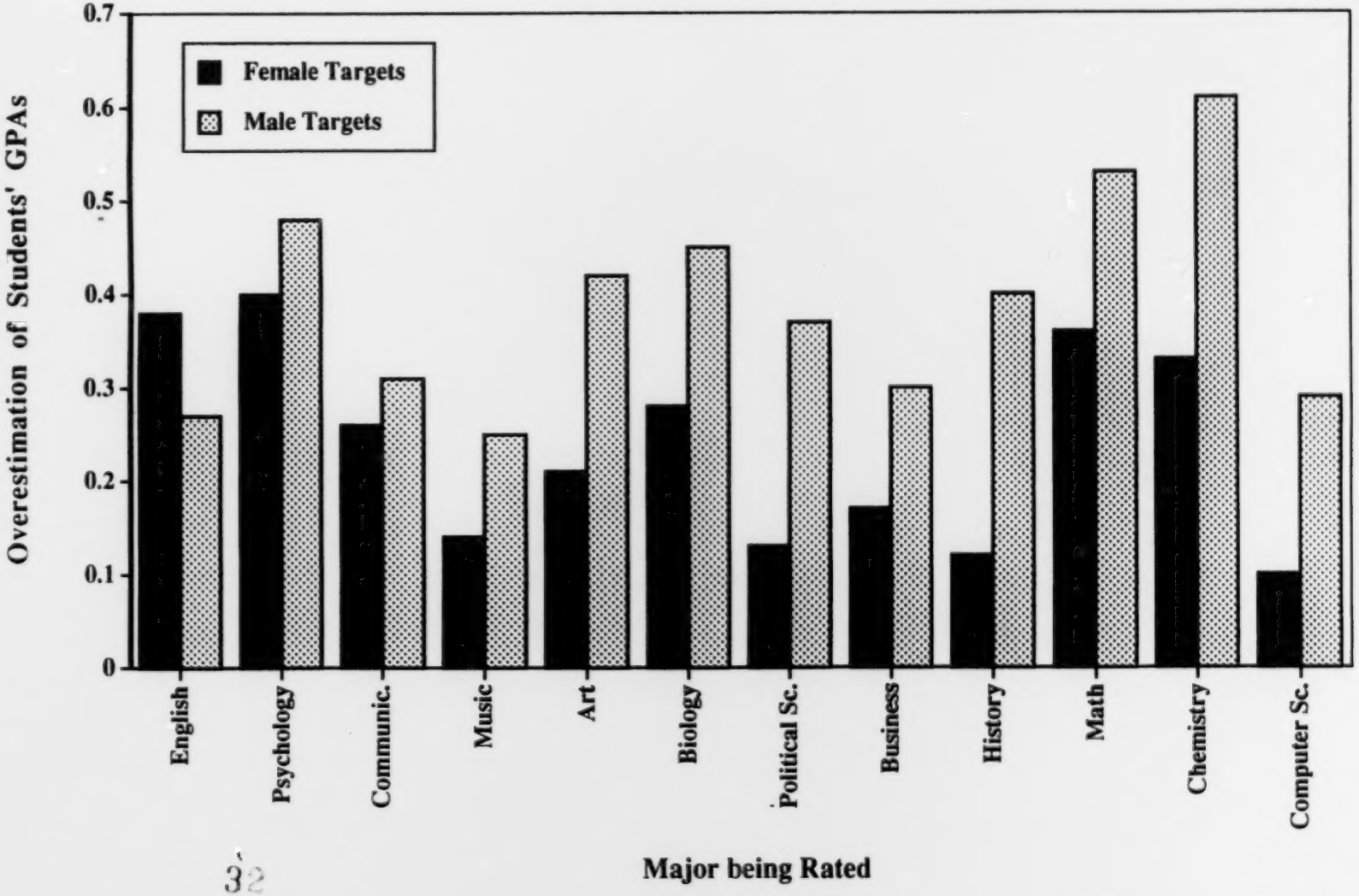

Figure 3. Male Raters' Overestimation of Female and Male Students' GPAs